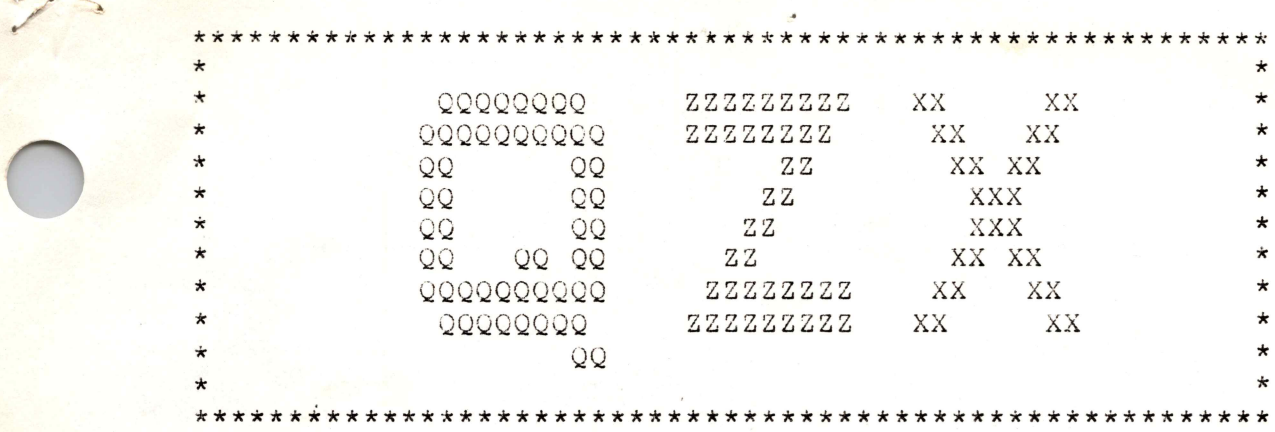
QQQQQQQ ZZZZZZZZZ XX XX
QQQQQQQQQ ZZZZZZZZ XX XX
QQ QQ ZZ XX XX
QQ QQ ZZ XXX
QQ QQ ZZ XXX
QQ QQ QQ ZZ XX XX
QQQQQQQQQ ZZZZZZZZ XX XX
QQQQQQQ ZZZZZZZZZ XX XX
QQ

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Alex F. Burr,K5XY
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Ambrose 'Bo' Barry,W4GHV/5
Editor

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MORE

"TYPE" PROGRAM

BY R. J. LEES - W3ZQN

MAY, 1983

I RECENTLY ACQUIRED A TIMEX/SINCLAIR 2040 PRINTER AND WANTED A WAY TO USE IT, WITH MY ZX-81 COMPUTER, TO PRODUCE TYPWRITTEN MATERIAL. THIS PROGRAM, WHICH I NAMED "TYPE", ACCOMPLISHES THAT END. YOU CAN JUDGE ITS OUTPUT FOR YOURSELF, BECAUSE I AM USING "TYPE" TO PREPARE THIS ARTICLE.

PROGRAM FEATURES

"TYPE" WORKS AS FOLLOWS: YOU ENTER TEXT VIA THE COMPUTER KEYBOARD. THE CURRENT LINE ALWAYS APPEARS ON THE TV MONITOR AT THE BOTTOM OF THE SCREEN. AS LINES ARE COMPLETED THEY SCROLL UP THE SCREEN.

A GRAY SQUARE CURSOR SHOWS THE NEXT PRINT POSITION, UNLESS THE CURSOR IS WITHIN FIVE PLACES OF THE RIGHT HAND MARGIN. NEAR THE MARGIN THE CURSOR CHANGES TO AN INVERSE NUMBER FROM FIVE TO ONE, THE NUMBER REPRESENTING THE NUMBER OF PRINT SPACES LEFT ON THE LINE. (THIS PERMITS PLANNING AHEAD TO HYPHENATE WORDS OR MOVE TO THE NEXT LINE IF A WORD WILL NOT FIT.)

LINES OF TEXT ARE ENTERED UNTIL THE SCREEN IS FULL (22 LINES). THE CURSOR THEN DISAPPEARS AND THE 22 LINES MAY EITHER BE EDITED OR COPIED ON THE PRINTER.

WHEN COPYING IS COMPLETE, THE SCREEN SCROLLS UP ONE LINE, THE LAST LINE PRINTED IS MARKED BY REPLACING THE FIRST FIVE CHARACTERS WITH "-----" AND THE NEXT 22 LINES OF TEXT MAY BE TYPED. THIS PROCESS CONTINUES UNTIL THE TEXT IS COMPLETELY COPIED BY THE PRINTER. PREVIOUSLY COPIED LINES ARE RETAINED ON THE SCREEN FOR REFERENCE, BUT EVENTUALLY THEY ALL SCROLL OFF THE TOP OF THE SCREEN AS NEW LINES ARE ADDED. NO TEXT EXCEPT WHAT IS ON THE SCREEN IS RETAINED IN COMPUTER MEMORY. LIMITED EDITING IS POSSIBLE AS DISCUSSED BELOW.

USING THE PROGRAM

ENTER THE PROGRAM AS SHOWN ON THE LISTING. AFTER CHECKING TO MAKE SURE IT WORKS, SAVE IT ON TAPE BY STARTING YOUR RECORDER AND ENTERING "GOTO 9000". AFTER HAVING BEEN SAVED THIS WAY "TYPE" WILL START AUTOMATICALLY WHENEVER IT IS LOADED.

"TYPE" WILL PRINT ANY OF THE NORMAL OR SHIFTED KEYBOARD CHARACTERS. IT WILL NOT PRINT GRAPHICS SYMBOLS. SPACES ARE INSERTED BY USING THE "ENTER" KEY. (THE NORMAL "SPACE" KEY DOES NOT WORK BECAUSE ITS USE WILL "BREAK" THE RUNNING PROGRAM.

BACKSPACE BY USING SHIFTED "0". THIS WILL ALSO DELETE WHATEVER IS BACKSPACED OVER.

NEW LINES MAY BE STARTED IN EITHER OF TWO WAYS: FILLING THE CURRENT LINE WITH TEXT OR SPACES WILL AUTOMATICALLY RESULT IN A SCROLL TO A NEW LINE, OR ENTERING A SHIFTED "5" WILL START A NEW LINE. TO ADD BLANK LINES (SUCH AS BETWEEN PARAGRAPHS) JUST HIT SHIFTED "5" AS MANY TIMES AS DESIRED.

TO EDIT A PREVIOUSLY TYPED LINE, POSITION THE CURSOR AT THE LEFT HAND MARGIN (FIRST POSITION OF A NEW LINE). THEN ENTER A SHIFTED "1". THE COMPUTER WILL ASK FOR A NUMERICAL INPUT ("L" CURSOR). COUNT UP THE NUMBER OF LINES TO THE LINE TO BE EDITED, STARTING WITH THE LAST COMPLETE LINE AS NUMBER ONE. ENTER THIS NUMBER. THE GRAY CURSOR WILL NOW APPEAR AT THE BEGINNING OF THE LINE TO BE EDITED. THIS LINE MAY THEN BE RETYPED. COMPLETION OF THE ENTIRE LINE WILL AUTOMATICALLY RETURN THE GRAY CURSOR TO THE NEXT NEW LINE. OR YOU MAY RETYPE THE LINE BEING EDITED UNTIL THE GRAY CURSOR IS IN A SPACE BETWEEN WORDS. THEN HIT SHIFTED "5" TO RETURN TO THE NEXT NEW LINE.

WHEN THE SCREEN IS FULL (22 NEW, UNCOPIED LINES) THE GRAY CURSOR WILL DISAPPEAR AND MOST KEYS WILL BECOME INOPERATIVE. AT THIS POINT YOU HAVE TWO OPTIONS: EDIT OR COPY THE SCREEN TO THE PRINTER. TO EDIT, FOLLOW THE PROCEDURE DESCRIBED ABOVE (ENTER SHIFTED "1" AND THEN THE LINE NUMBER TO BE EDITED, COUNTED FROM BOTTOM UP). WHEN YOU ARE SATISFIED THAT THE SCREEN CONTAINS WHAT YOU WANT TO PRINT, ACTIVATE THE PRINTER BY HITTING SHIFTED "Z".

PROGRAM DISADVANTAGES

"TYPE" HAS THE FOLLOWING DRAWBACKS, WHICH ARE BOTH HARDWARE AND SOFTWARE RELATED.

1- THE PROGRAM IS FAST ENOUGH FOR A "HUNT-AND-PECK" TYPER LIKE ME, BUT DO NOT EXPECT FANTASTIC SPEED. IF YOU GO TOO FAST YOU WILL GET GRAY SQUARES PRINTED INSTEAD OF THE CHARACTERS YOU HAD INTENDED. IF THIS HAPPENS JUST BACKSPACE AND TYPE AGAIN.

2- AS WRITTEN, "TYPE" ONLY COPIES A FULL SCREEN AT A TIME, EVEN WHEN THE SCREEN CONTAINS ONLY ONE OR TWO LINES OF TEXT.

3- LOWER CASE LETTERS ARE IMPOSSIBLE, OF COURSE, THEY SIMPLY DO NOT EXIST ON THIS COMPUTER.

4- EDITING CAPABILITY IS LIMITED. AS LONG AS THE CHANGES FIT INTO A PREVIOUSLY TYPED LINE YOU ARE OK. BUT TO MAKE LENGTHLY INSERTS OR CHANGES YOU WILL PROBABLY HAVE TO RETYPE STARTING AT THE FIRST CHANGE, OR USE "CUT-AND-PASTE".

5- YOU CANNOT TYPE GRAPHICS CHARACTERS.

FINAL THOUGHTS

I HOPE YOU FIND "TYPE" AS USEFUL AS I HAVE. IF YOU FIND WAYS TO IMPROVE IT, PLEASE LET ME KNOW.

FOR ANY INTERESTED, I AM WILLING TO SUPPLY A PROGRAM PACKAGE. IT WILL CONTAIN TWO COPIES OF THE PROGRAM ON THE SIDES OF A C-20 CASSETTE PLUS HARD COPIES OF THIS ARTICLE AND THE PROGRAM LISTING. THE PRICE IS $6.00 VIA CHECK OR MONEY ORDER TO: 705 JONATHAN RD., KING OF PRUSSIA, PA. 19406. ORDERS VIA CHECK WILL BE HELD THREE WEEKS TO ALLOW THE CHECK TO CLEAR. YOUR CASSETTE WILL HAVE BEEN CHECKED FOR PROPER OPERATION ON MY SYSTEM, BUT I CANNOT OFFER A REFUND IF IT FAILS TO WORK ON YOURS.

PROGRAM NOTES

```
 L=NUMBER OF LINES PLACED ON
   SCREEN SINCE LAST "COPY".
   (0 TO 22)
 N=SCREEN LINE NUMBER FOR
   CURRENT PRINTING.   (ALWAYS
   21 UNLESS IN EDIT MODE.)
 C=POSITION OF CURSOR ON THE
   CURRENT SCREEN LINE.
   (0 TO 31)
EL=EDIT LINE WHEN EDITING LESS
   THAN A FULL SCREEN.
EM=EDIT LINE WHEN EDITING A FULL
   SCREEN.
```

"TYPE" PROGRAM LISTING

```
   1 REM PROGRAM "TYPE" BY W3ZQN
- R. J. LEES, 705 JONATHAN RD.,
KING OF PRUSSIA, PA. 19406, JAN,
1983
   5 LET L=0
  10 LET N=21
  20 LET C=0
  30 PRINT AT N,C;"▒"
  40 SLOW
  50 IF INKEY$<>"" THEN GOTO 50
  60 IF INKEY$="" THEN GOTO 60
  70 FAST
  80 PRINT AT N,C;INKEY$;
  90 IF INKEY$=CHR$ 118 THEN GOT
O 300
 100 IF INKEY$=CHR$ 114 THEN GOT
O 400
 110 IF INKEY$=CHR$ 119 THEN GOT
O 500
 120 IF INKEY$=CHR$ 117 AND C=0
THEN GOTO 600
 130 LET C=C+1
 140 IF C=32 THEN GOTO 410
 150 IF C<27 THEN PRINT AT N,C;"
▒"
 160 IF C=27 THEN PRINT AT N,C;"
5"
 170 IF C=28 THEN PRINT AT N,C;"
4"
 180 IF C=29 THEN PRINT AT N,C;"
3"
 190 IF C=30 THEN PRINT AT N,C;"
2"
 200 IF C=31 THEN PRINT AT N,C;"
1"
 210 GOTO 40
 300 PRINT AT N,C;" "
 320 GOTO 130
 400 PRINT AT N,C;" "
 410 LET L=L+1
 420 IF L=22 THEN GOTO 700
 430 IF N<>21 THEN GOTO 10
 440 SCROLL
 450 GOTO 20
 500 PRINT AT N,C;" "
 510 IF C=0 THEN GOTO 530
 520 LET C=C-1
 530 GOTO 30
 600 INPUT EL
 610 LET N=21-EL
 620 LET L=L-1
 630 GOTO 20
 700 SLOW
 710 IF INKEY$<>"" THEN GOTO 710
 720 IF INKEY$="" THEN GOTO 720
 730 FAST
 740 IF INKEY$=CHR$ 117 THEN GOT
O 900
 750 IF INKEY$=CHR$ 14 THEN GOTO
 770
 760 GOTO 700
 770 COPY
 780 PRINT AT 21,0;"-----"
 790 SCROLL
 800 GOTO 5
 900 INPUT EM
 910 LET N=22-EM
 920 LET L=L-1
 930 GOTO 20
9000 SAVE "TYP▒"
9010 GOTO 5
```

TYPE 'Word Processing Program

by

R. J. Lee, W3ZQN

Here's another nice program from Bob, and is a 'must' for those of you needing a 'word processor' on a shoestring budget. It shrank and printed nicely on the preceding page. The program was used to create the article, so you can actually see what it does.

Simple Mods for ZXAS & ZXDB

by

Rob Suggs, KB5EZ

The BUG-BYTE ZXAS assembler and ZXDB disassembler/debugger comprise a fairly powerful machine level programming package. In this article I will describe a few simple modifications to the BASIC portion of each program which will make them a little more convenient to use. I will also describe memory useage of the two packages and show you where to assemble your code.

Let's first consider the ZXAS program used by itself. When you first load ZXAS from cassette, it is located in tne lower 5K of RAM in your 16K memory module. (this would be true if you were using larger memories but I will assume the 16K pack is being used). The machine code is contained in statement number 10 (a 5K long REM statement). When you type RUN, line 20 (RAND USR 16514) is executed which does a block move thereby copying the machine code into the upper 5K of RAM and setting RAMTOP to just below this 5K block. You may now free the space occupied by the original code by typing 10 RETURN. This erases that long REM statement and moves the rest of the BASIC driver routine to the bottom of memory. You are now ready to enter your assembler source code mnemonics into REM statements and assemble your program. You may assemble into any memory locations but I prefer to assemble into a REM statement which is the first statement in my BASIC program. This is always at address 16514, so there is no need to input it each time.

The following is a listing of the BASIC portion of ZXAS with my modifications marked by a *.

```
*   11 REM  123456789012345.....
        (put in enough digits for your
        program; 1 digit per byte)
*   12 REM (
    20 RAND USR 16514
* 8998 REM )
* 8999 STOP
  9000 FAST
* 9010 LET ZZZ=16514
  9020 POKE 32641,INT(ZZZ/256)
  9030 POKE 32640,ZZZ-256*INT(ZZZ
                              /256)
  9040 RAND USR 28565
  9050 PRINT AT 21,0;"ERROR ";
                          PEEK 32651
  9060 SLOW
```

To save this modified version of ZXAS, you should LOAD "ZXAS", enter these modifications, and SAVE "ZXAS1" BEFORE you RUN and remove line 10. To use ZXAS1, you should 1. LOAD "ZXAS1", 2. RUN, 3. Type 10 RETURN (new line), 4. Enter your assembler code at lines 13 to 8997 in REM statements. For example:

```
13 REM LD A.2     * LOAD A WITH 2
14 REM ADD A.3    * ADD 3
15 REM LD B.0     * CLR HIGH OF BC
16 REM LD C.A     *PUT ANSWER IN C
17 REM RET        *ANSWER IS IN BC
                  (RETURN TO BASIC)
```

Feel free to replace the original line 20 at this point because it was the ZXAS relocater call. You may want to leave line 20 in order to begin execution of YOUR own assembled code since it will now begin at the same location. 5. Be sure you have enough dummy bytes reserved in line 11, and lastly, type GOTO 9000 to assemble your program.

When the program is assembled you will note that line 11 looks different because the digit character codes have now been replaced by the assembled code. Any reference to USR 16514 will now execute your program. For our example, type PRINT USR 16514 and the answer 5 will be printed. If you now SAVE your work you will have the code in line 11 and the listing in lines 13-8997 to make editing easy. When you want to work on it again, just load and relocate ZXAS as before then LOAD your program. It already contains the ZXAS BASIC driver lines 8999 to 9060.

But what if you also have ZXDB and would like to use it at the same time? Simply LOAD & RUN ZXAS or ZXAS1. Then LOAD ZXDB, which resides

in a 4K REM statement at line 1 of its BASIC program. 576 bytes are reserved from $50C0 to $52FF (20672-21247 decimal) for you to assemble into but I prefer to assemble into my own REM statement as before. The first free address in a REM statement after the ZXDB is 21254 so that the following modifications to ZXDB's BASIC driver may be used.

```
    1 REM ..... ZXDB'S CODE
          (LEAVE IT ALONE)
*   2 REM 12345... FOR YOUR CODE
   10 PRINT USR 16640
*  12 REM (
       USER'S SOURCE CODE
* 8998 REM )
* 8999 STOP
  9990 FAST
* 9994 LET ZZZ=21254
  9995 POKE 32640,ZZZ-256*INT(ZZZ
                              /256)
  9996 POKE 32641,INT(ZZZ/256)
  9997 RAND USR 28565
  9999 PRINT AT 21,0;"ERROR ";PEEK
                              32651
```

Again, you should save this as something like "ZXDB1" for use later. To use the assembler simply enter your code in REMs from 13-8997 as before. To assemble, type GOTO 9000. To use ZXDB type RUN and follow the instructions. You can then single step, debug, etc your code which resides in line 2. If you want to save a work in progress simply SAVE "filename". Note that this will also save all of ZXDB and will take some time. If you are finished with your program development you may remove ZXDB's code by typing 1 RETURN. BEWARE: This will move your assembled code down to the bottom of BASIC RAM and any references to addresses in its previous locations will no longer be valid. You MUST use relative addressing if you intend to relocate your program! You may now SAVE only your program and the ZXDB BASIC driver.

With these simple modifications your ZXAS and/or ZXDB can be a little more convenient to use. Good ZXing! (Editor note: I wonder if these mods will allow DEFB, DEFM (reservation of memory for data)? Has anyone come up with a way?)

Digitalker Speech Synthesizer

by

Richard Evarts, *****

Following on the next convenient page is a 'term paper' written by one of my students who tackled the job of interfacing the National Digitalker chip set to his TS1000. It really sounded nice. I hope the article is easily readable, the original was pretty faint. (I gave him an A for the project anyway.) I think we have the PC negative if anyone is interested in building one. If interested, send SASE to the editor for a copy of the data sheets with vocabulary.

S A S

Size-Accuracy-Speed

by

Bo Barry, W4GHV

I did finally find time to get a hard copy of working versions of my 3 sort routines. I haven't had time to work on them lately and hope to do so while 'vacationing' in N.C. Perhaps some of you 'novices' (beginners) want to tackle them and try to improve their size or speed. I need feedback from you all! Lines marked with * are those with changes from the original listings (in previous issues). The Bubble Sort listing is complete and the other two are partial listings. The beginning of the Shell Sort is given, and lines 357-1550 from the Bubble Sort should be added to it. The Recursive Quicksort needs the following lines (from the Bubble Sort) added: 100-120, 125-235, 357-380, 1000-1550. The listings follow the Digitalker article.

AMSAT AMS-81 TRACKING SYSTEM

The AMSAT AMS-81 TRACKING SYSTEM (software version) is ready for distribution. AMS-81 provides accurate access schedule and tracking information for satellites in PHASE II and PHASE III type orbits. Hardware requirements include only the SINCLAIR ZX-81 or TIMEX/SINCLAIR TS-1000 e/w 16K RAM, video display and cassette tape recorder.

Input data to AMS-81 are QTH latitude, longitude and height

ET 400 SPECIAL TOPICS

The National Semiconductor DT1050 Digitalker kit is a speech synthesizer made up of a Speech Processor Chip (SPC) and two Speech ROMs (SSR1 and SSR2) of 64k each. The Digitalker contains 137 different words, 2 tones and 5 silence durations and is available from Jameco Electronics for $35. By adding a power supply, clock network, filter, audio amplifier and a speaker, high-quality speech is reproduced.

Digitalker is really a digital recording and playback speech system which stores only those speech elements which the ear needs to understand speech. The actual speech is digitized from a recording at a rate at least twice that of the highest frequency in a waveform pattern. Four compression techniques are then used to obtain a compression factor of 4 to 1 which greatly limits the ROM space needed for storage. The first technique removes all redundant phonemes, repeated pitch periods or portions. The second technique called adaptive delta modulation takes the difference between succesive wave amplitudes and stores it instead of the amplitude values themselves. The third technique called phase-angle adjustment removes the direct component of the speech waveform which the ear does not use. The last technique is half-period zeroing which reduces the low-amplitude portion of the waveform to silence. This technique alone reduces the amount of ROM space required by 50%.

Other phoneme based speech synthesizer, notably General Instrument and the Votrax SC-01, produce intelligible speech but not of the quality of the Digitalker. The Votrax SC-01 usually sells for $50 and produces 64 speech sounds allowing for an unlimited vocabulary which is a big advantage over the Digitalker.

The basic design and foil pattern used appeared in the July 1982 issue of Radio Electronics. The design is relatively simple and straightforward requiring only 3 additional ICs in addition to the original circuit to interface it to a Z80 based Timex Sinclair 1000. During fabrication of the printed circuit board additional space was left at the edge of the board to accomodate the 3 additional ICs which will be used for address decoding and selection of the Digitalker.

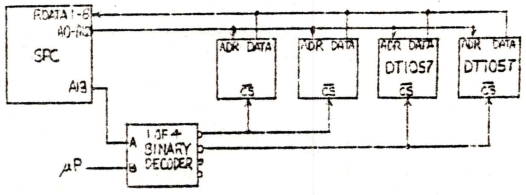
Because of difficulty finding a card edge connector with wire wrap pins suitable for use with the exposed connections at the back of the TS1000, an edge connector was improvised. A 50 position card edge connector with solder eyelets was purchased from Radio Shack. The connector was cut to fit the odd TS1000 configuration and solder pins cut from a 50 pin jumper header were soldered to the edge connector. After soldering all the components to the PC board, wire wrap connections from the TS1000 edge connector were made to the 3 address decoding chips. All 16 address lines are used in the decoding by using two 74LS30 NAND gates and one 74LS32 OR gate. When all "1" are output on the address bus by POKE 65535, XXX a "0" is generated at the output of each 74LS30. Both 74LS30 outputs are then input to the 74LS32 which is connected to the chip select ($\overline{CS}$) of the SPC. All 8 data lines are used to select any one of 143 words, tones or silence durations by entering

a decimal number from 0 to 143 after the POKE 65535 statement. The data lines, as well as the $\overline{WR}$ line, are wire wrapped directly from the TS1000 to the SPC. The data lines going to SW1 to SW8 while the $\overline{WR}$ line goes right to the $\overline{WR}$ pin. The power supply is obtained from the 9V and GND positions of the TS1000.

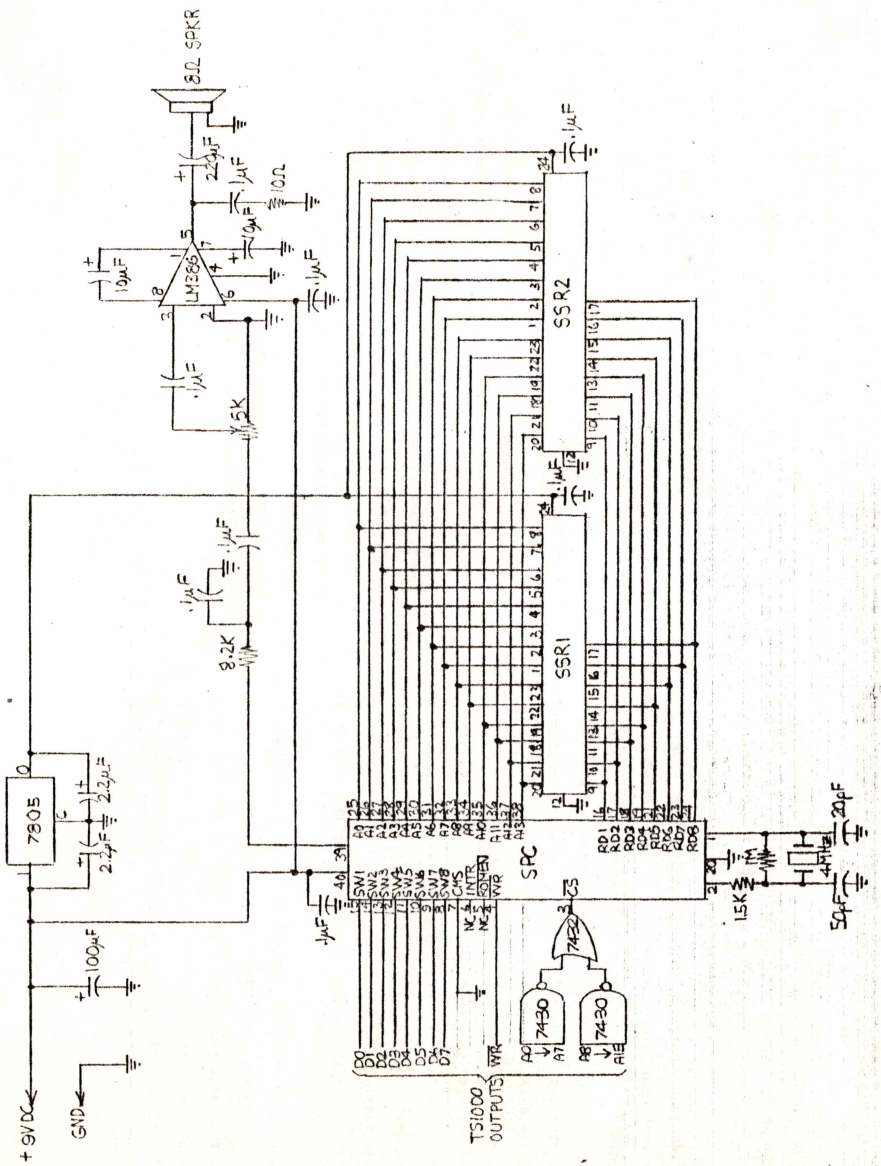
The SPC produces an INTR signal at the completion of each word which helps to provide uniform word spacing, but it require additional hardware and is not used in this version. A tri-state device could be used to enable the INTR line when word spacing is wanted and disabled when word splicing is done. Fairly good word spacing can be achieved by using PAUSE statements. The $\overline{ROMEN}$ (ROM enable) line which is used to switch the power supply of the ROMs on and off to conserve batteries also is not used. The CMS (command select) line is wired to ground to initiate the speech sequence.

Short programs which string words together to form phrases or sentences are easy to accomplish. A little trial and error is required to get decent word spacing, but pauses of 20 to 25 seem to work best. Creating new words from the limited vocabulary is also easy. To cut out the first part of a word for use in a new word, use short pauses then jam in another word or part of word over it.

The major drawback of the Digitalker speech synthesizer is its limited vocabulary. The DT1057 expands the vocabulary from 137 to over 260 words and consists of 2 ROMs of 64k each which are available from Jameco Electronics for $25. Since the SPC can only directly address up to 128k bits of memory some additional logic is needed to add the DT1057 to the basic Digitalker kit. A 1 of 4 binary decoder is needed to switch between the 2 sets of ROMs. Address 13 output from the SPC is usually used to select the ROMs. In this case it will be tied to the A input of the binary decoder, while input B will be used to select the ROMs. A "0" on input B will select the original DT1050 ROMs and a "1" will select the DT1057 ROMs. Input B will be controlled by the microprocessor.



The Digitalker speech synthesizer is an excellent device which produces lifelike speech. It has many applications which would be interesting and challenging to try. Several of the Timex games, such as their Flight Simulator program, could be enhanced by giving verbal information during game play. For example it could tell you "you are low on fuel" or "you have 2 miles to go". Talking clocks or appliances or even talking vending machines are possible with this system. In conclusion, I am very pleased with the Digitalker system and I am looking forward to experimenting with it more in the future.



ET-400 NATIONAL DIGITALKER SPEECH SYNTHESIZER

```
  5 PRINT "
 BUBBLE SORT DE
MO"
 100 PRINT "HOW
MANY NUMBERS?"
 110 INPUT Q
 120 DIM D(Q)
 125 PRINT "WANT
 RANDOM OR DESCE
NDING (R/D)?"
 130 INPUT Z$
 140 IF Z$="R" T
HEN GOSUB 1100
 145 IF Z$="D" T
HEN GOSUB 1000
 147 PRINT "WANT
 TO RUN SLOW OR
 FAST (S/F)?"
 148 INPUT Z$
 150 GOSUB 1300
 200 PRINT
 230 PRINT "STAR
T TIMING ME NOW"
* 235 IF Z$="F" T
HEN FAST
 240 LET M=Q
 245 LET YES=0
 250 FOR I=1 TO
M-1
 260 FOR J=I+1 T
O M
 270 LET COMPARE
=COMPARE+1
 280 IF D(I)<=D(
J) THEN GOTO 340
 290 LET YES=1
 300 LET SWAP=SW
AP+1
 310 LET T=D(I)
 320 LET D(I)=D(
J)
 330 LET D(J)=T
 340 NEXT J
 350 NEXT I
 355 IF YES=1 TH
EN GOTO 245
 357 PRINT
 360 PRINT "I AM
 DONE"
* 365 SLOW
 370 GOSUB 1400
 375 PRINT
 376 GOSUB 1500
 377 PRINT PEEK
(16396)+PEEK (16
397)*256-16590;"
 BYTES WERE USED
"
 380 STOP
 1000 REM BUILDS
ARRAY OF DESCEND
ING NUMBERS
*1005 FAST
 1010 PRINT "HERE
S WHAT I AM GOIN
G TO SORT"
*
 1030 LET J=Q
 1040 FOR I=1 TO
Q
 1050 LET D(I)=J
 1060 LET J=J-1
 1070 PRINT D(I);
" ";
 1090 NEXT I
 1092 PRINT
* 1095 SLOW
 1099 RETURN
 1100 REM BUILDS
A RANDOM ARRAY
 1105 FAST
 1110 PRINT "HERE
S WHAT I AM GOIN
G TO SORT"
 1115 FOR I=1 TO
Q
 1120 LET D(I)=IN
T (RND*100)
 1130 PRINT D(I);
" ";
 1140 NEXT I
 1145 PRINT
* 1150 SLOW
 1160 RETURN
*
 1300 LET COMPARE
=0
 1310 LET SWAP=0
 1320 RETURN
 1400 PRINT "SWAP
S= ";SWAP,"COMPA
RES= ";COMPARE
 1410 PRINT Q;" N
UMBERS WERE SORT
ED"
 1420 RETURN
* 1500 FAST
 1510 PRINT "HERE
S THE SORTED LIS
T"
 1515 FOR I=1 TO
Q
 1520 PRINT D(I);
" ";
 1530 NEXT I
 1535 PRINT
* 1540 SLOW
 1550 RETURN
```

```
  5 PRINT "
 SHELL SORT DEM
O"
 100 PRINT "HOW
MANY NUMBERS?"
 110 INPUT Q
 120 DIM D(Q)
 125 PRINT "WANT
 RANDOM OR DESCE
NDING (R/D)?"
 130 INPUT Z$
 140 IF Z$="R" T
HEN GOSUB 1100
 145 IF Z$="D" T
HEN GOSUB 1000
 147 PRINT "WANT
 TO RUN SLOW OR
 FAST (S/F)?"
 148 INPUT Z$
 150 GOSUB 1300
 200 PRINT
 230 PRINT "STAR
T TIMING ME NOW"
 235 IF Z$="F" T
HEN FAST
 240 LET M=Q
 245 LET M=INT (
M/2)
 250 IF M=0 THEN
 GOTO 357
* 260 LET J=1
* 270 LET K=Q-M+1
 280 LET I=J
 290 LET L=I+M
 300 LET COMPARE
=COMPARE+1
 310 IF D(I)<=D(
L) THEN GOTO 353
 320 LET T=D(I)
 330 LET D(I)=D(
L)
 344 LET D(L)=T
 346 LET SWAP=SW
AP+1
 348 LET I=I-M
 350 IF I<1 THEN
 GOTO 353
 352 GOTO 290
 353 LET J=J+1
* 355 IF J>=K THE
 N GOTO 245
* 356 GOTO 280
```

```
  5 PRINT "
 RECURSIVE QUIC
K SORT DEMO"
 121 DIM L(20)
 122 DIM H(20)
* 123 DIM A(20)
 240 LET N=Q
 250 GOSUB 400
```

S-A-S SORT - ROUTINES

```
 400 LET S=1
 410 LET L(1)=1
 420 LET H(1)=N
* 430 IF L(S)>=H(
S) THEN GOTO 720
 440 LET M=INT (
(L(S)+H(S))/2)
 450 LET X=D(M)
 460 LET I=L(S)
 470 LET J=H(S)
 480 IF D(I)>=X
THEN GOTO 510
 490 LET I=I+1
 500 GOTO 480
 510 IF D(J)<=X
THEN GOTO 540
 520 LET J=J-1
 530 GOTO 510
 540 LET COMPARE
=COMPARE+1
 550 IF I>J THEN
 GOTO 620
 560 LET SWAP=SW
AP+1
 570 LET T=D(I)
 580 LET D(I)=D(
J)
 590 LET D(J)=T
 600 LET I=I+1
 610 LET J=J-1
 620 IF I<=J THE
N GOTO 480
* 630 LET A(S)=I
 640 LET S=S+1
* 650 LET L(S)=L(
S-1)
 660 LET H(S)=J
 670 GOSUB 430
 680 LET S=S+1
* 690 LET L(S)=A(
S-1)
* 700 LET H(S)=H(
S-1)
* 710 GOSUB 430
* 720 LET S=S-1
* 730 RETURN
```

coordinates and Keplerian orbital elements for up to 14 spacecraft. Access schedule output includes dates, AOS and LOS times and other informative data. Tracking output includes UTC times, azimuth and elevation coordinates, slant range and doppler shift data.

AMS-81 is a highly accurate satellite tracking tool developed by AMSAT to allow OSCAR (Orbiting Satellite Carrying Amateur Radio) operators to access its soon to be launched PHASE IIIB spacecraft.

The AMSAT AMS-81 TRACKING SYSTEM may be ordered by sending $15 (US) to:

AMSAT AMS-81 TRACKING SYSTEM
c/o Bob McCaffrey, KØCY
3913 29th Street
Des Moines, Iowa 50310

AMSAT (The Radio Amateur Satellite Corporation) is a non-profit organization dedicated to the design, development, construction, launch and operation of Amateur Radio communications satellites. Proceeds from AMS-81 sales will be used to fund future projects. Further information about AMSAT and its projects is available through:

AMSAT
P.O. Box 27
Washington, D.C. 20044

*** Ralph Wallio, WØRPK ***

Impedance Matching Program

by

D. W. Williams, WAØMRG

Here's a neat program that takes the work out of matching a transmitter to an antenna! Included is a 'screen dump' of the results. The listing and the one for the next article are together on the next convenient page.

Feedhorn Design Program

by

D. W. Williams, WAØMRG

If you are into feedhorn design here's a nice program (with screen dump).

Editor's Doings

Here's what I have been doing in between the sessions spent on my TRS80 preparing this newsletter.

This issue is being mailed as I head toward N. C. for two weeks. The June issue is 80% done and will be mailed in mid June when I return. Listen for me mobile on 2 meters as we make the trek across Texas, etc. You Tarheels can find me on the Hickory, Asheville, and Morganton repeaters from May 29th thru June 9th. Better yet, come to Morganton and help me swat mosquitoes and compute (tel # 437-1137).

Unclassified

WANTED: Unclassified ads for publication in QZX. Cost is 1 cent for each keystroke (characters, blanks, etc). Payment must be included with order. This is an excellent way to sell your unwanted equipment, ask for help, find a specific program, etc. Send your ad in with payment to QZX, 2025 O' Donnell, Las Cruces, N.M. 88001.

****

KITS/MODULES FROM KALTEK
BOX 7462, ROCHESTER, NY 14615

SL-6: Touch-initiated one-second SHIFT lock speeds programming, lights LED to avoid errors, allows one-finger entries. $17.46

BC-80 (ZX80 ONLY): Blinking cursors and livelier graphics jump out at you & speed programming. $14.99

RC-111 Module: Digital Ohms, MFD, Light, Time, Temp, Antenna Angle, and more with cheap constant add calculators. Simple! $14.62

Prompt delivery, full support, no quibble guarantee, SASE for data. NYS add sales tax, foreign add 2 oz postage each. First Class PPD USA.

****

FOR-SALE: SWR Program- enter up to 10 frequencies and power readings. Calculates and plots SWR on a bar graph. 8K/16K. Cassette $6.00 + $1.50 S&H. Listing only - $2.00. Send to K5MIL, 2905 Prescott, Garland, Tx. 75041.

FOR SALE: - RTTY Program for TS1000/ZX81 (2k only). A far more sophisticated version of the RTTY transceive program that appeared

```
  1 REM "IMPEDA
NCE"
  5 REM BY D. W
ILLIAMS WA0MRG
 10 PRINT TAB 2
;"SERIES SECTION
 TRANSMISSION"

 20 PRINT TAB 4
;"LINE IMPEDANCE
 MATCHING"

 30 PRINT

 40 PRINT

 50 GOSUB 5000

 60 PRINT "ENTE
R IMPEDANCE OF Z
0."

 70 INPUT Z0

 75 IF Z0<=0 TH
EN GOTO 70
 77 PRINT AT 9,
25;Z0
 80 PRINT

 90 PRINT "ENTE
R IMPEDANCE OF Z
1."

 100 INPUT Z1

 105 IF Z1<=0 TH
EN GOTO 100
 107 PRINT AT 11
,25;Z1
 110 PRINT

 120 PRINT "ENTE
R LOAD RESISTANC
E."

 130 INPUT RL

 135 IF RL<=0 TH
EN GOTO 130
 137 PRINT AT 13
,25;RL
 140 PRINT

 150 PRINT "ENTE
R LOAD REACTANCE
."

 160 INPUT XL

 165 PRINT AT 15
,25;XL
 170 PRINT

 180 LET N=Z1/Z0

 190 LET R=RL/Z0

 200 LET X=XL/Z0

 205 LET P=(R-1)
*(R-1)
 210 LET Q=(N-1/
N)*(N-1/N)
 215 LET J=(R*Q-
P-X*X)
 220 IF J<=0 THE
N GOTO 4000
 230 LET B=SQR (
(P+X*X)/(R*Q-P-X
*X))

 240 LET A=((N-
R/N)*B+X)/(R+X*N
*B-1))

 250 LET L2=ATN
B
 260 LET L1=ATN
A
 270 IF L1<0 THE
N LET L1=L1+PI
 280 PRINT "ENTE
R FREQUENCY, (MH
Z)"

 290 INPUT F

 295 IF F<=0 THE
N GOTO 290
 297 PRINT AT 17
,25;F
 300 PRINT

 310 PRINT "ENTE
R VELOCITY FACTO
R (Z0)."

 320 INPUT VF

 325 IF VF<=0 OR
 VF>1 THEN GOTO
320

 327 PRINT AT 19
,28;VF
 330 PRINT

 340 PRINT "ENTE
R VELOCITY FACTO
R (Z1)."

 350 INPUT V

 355 IF V<=0 OR
V>1 THEN GOTO 35
0

 357 PRINT AT 21
,28;V
 360 LET V=984/F

 370 LET V1=V*VF

 380 LET V2=V*V

 390 LET L1=L1/P
I*180
 400 LET L2=L2/P
I*180
 410 LET L1=(L1*
V1)/360
 420 LET L2=(L2*
V2)/360
 430 CLS

 440 GOSUB 5000

 450 PRINT "IF I
MPEDANCE Z0=";Z0
 460 PRINT "AND
IMPEDANCE Z1=";Z
1

 470 PRINT "AND
LOAD IMPEDANCE="
;RL;"+J";XL

 480 PRINT "THEN
AT ";F;" MHZ"
 490 PRINT "L1="
;L1;" FEET"
 500 PRINT "L2="
;L2;" FEET"
 510 PRINT

 520 IF L1<1 THE
N LET L3=L1*12
 530 IF L1>=1 TH
EN GOTO 550
 540 PRINT "OR L
1=";L3;" INCHES"
 550 IF L2<1 THE
N LET L4=L2*12
 560 IF L2>=1 TH
EN GOTO 580
 570 PRINT "OR L
2=";L4;" INCHES"
 580 PRINT

 800 PRINT TAB 5
;"PRESS ENTER TO
 RETURN"

 810 IF INKEY$<>
CHR$ 118 THEN GO
TO 810

 820 CLS

 850 GOTO 10

4000 CLS

4010 PRINT AT 5,
0;"IMPEDANCE OF
Z1 IS TO CLOSE T
O"
4020 PRINT "IMPE
DANCE OF Z0, PIC
K ANOTHER "

4030 PRINT "VALU
E AND TRY AGAIN.
"

4040 PRINT

4050 PAUSE 100

4060 CLS

4070 GOTO 10

5000 PRINT AT 4,
8;"
"

5010 PRINT AT 5,
2;"INPUT-
-LOAD"

5020 PRINT AT 6,
8;"
"

5030 PRINT AT 7,
13;"L2  L1"
5040 PRINT

5050 RETURN
```

INPUT- -LOAD

L2 L1

```
IF IMPEDANCE Z0= 52
AND IMPEDANCE Z1 =300
AND LOAD IMPEDAN CE=277+J0
THEN AT 14 MHZ
L1=2.7979026 FEE T
L2=2.522221 FEET

    PRESS ENTER TO RETURN
```

```
  1 REM "FEEDHO
RN DESIGN"
  5 FAST

 10 REM "BY DAL
LAS WILLIAMS"
 20 DIM A(61)

 30 DIM B(61)

 40 LET C=1

 50 FOR N=1 TO
13 STEP .2
 60 LET A(C)=10
-8*COS (N/6*PI)
 70 LET B(C)=22
+8*SIN (N/6*PI)
 80 LET C=C+1

 90 NEXT N

 100 SLOW

 110 PRINT TAB 8
;"FEEDHORN DESIG
N"

 120 PRINT

 130 PRINT "ENTE
R FREQUENCY IN M
HZ."

 140 INPUT F

 150 IF F<=0 THE
N GOTO 140
 160 PRINT AT 3,
25;F
 170 PRINT

 180 PRINT "DO Y
OU WISH DIMENSIO
NS IN"

 190 PRINT "METR
IC? (Y OR N)"
 200 INPUT Q$

 210 IF Q$="N" T
HEN LET V=11811/
F

 220 IF Q$="Y" T
HEN LET V=30000/
F

 230 IF Q$<>"Y"
AND Q$<>"N" THEN
 GOTO 200

 240 IF Q$="N" T
HEN LET Q$=" INC
HES"

 250 IF Q$="Y" T
HEN LET Q$=" CM"
 260 LET D1=V/1.
71
 265 LET D2=V/1.
3065
 267 PRINT

 270 PRINT "ENTE
R DIAMETER IN UN
ITS PICKED"

 272 PRINT "ABOV
E. (INCHES OR CM
)"

 275 INPUT D3

 277 IF D3<=0 TH
EN GOTO 275
 291 LET U=V/(D3
*1.71)
 292 LET T=U*U

 293 IF T>=1 THE
N GOTO 500
 295 LET VG=V/(S
QR (1-T))
 300 CLS

 310 PRINT "FEED
HORN DESIGN FOR
";F;" MHZ."

 320 PRINT

 330 PRINT "DIAM
ETER SHOULD BE B
ETWEEN"

 340 PRINT D1;"
AND ";D2;Q$
 345 PRINT "FOR
DOMINANT MODE. (
TE11)"

 350 PRINT "CHOS
EN DIA. IS ";D3;
Q$

 360 GOSUB 1000

 370 LET Z=VG/4

 380 PRINT "LENG
TH=";Z*2.5;Q$
 390 PRINT "PROB
E LENGTH=";V/4;Q
$

 400 PRINT "PROB
E SPACING=";Z;Q$
 410 PRINT "FROM
 CLOSED END."
 420 PRINT "ANOT
HER? (Y OR N)"
 430 INPUT X$

 440 IF X$="Y" T
HEN GOTO 470
 450 IF X$<>"N"
THEN GOTO 430
 460 STOP

 470 CLS

 480 GOTO 100

 500 CLS

 510 PRINT AT 10
,0;"THE DIAMETER
 CHOSEN IS AT OR
"
 520 PRINT "BEYO
ND CUTOFF AND TH
US WOULD"

 530 PRINT "WORK
 POORLY OR NOT A
T ALL."

 535 PRINT "PICK
 SMALLER DIAMETER
"

 540 PRINT "OR T
RY LOWER FREQUENC
Y"

 550 PAUSE 500

 560 CLS

 570 GOTO 100

1000 FOR N=1 TO
61
1010 PLOT A(N),B
(N)
1020 NEXT N

1030 FOR N=30 TO
 60
1040 PLOT N,14

1050 PLOT N,30

1060 NEXT N

1070 FOR N=14 TO
 30
1080 PLOT 60,N

1090 NEXT N

1100 FOR N=15 TO
 20
1110 PLOT 51,N

1120 PLOT 52,N

1130 PLOT 10,N

1140 NEXT N

1150 PRINT AT 11
,19;"PROBE-"
1160 PRINT AT 15
,4;"-------CONNE
CTOR-----"

1170 PRINT

1180 RETURN

1200 CLS

1210 SAVE "FEEDH
ORN DESIGN"
1220 GOTO 100
```

```
FEEDHORN DESIGN FOR 1000 MHZ.

DIAMETER SHOULD BE BETWEEN
6.9070175 AND 9.0401837 INCHES
FOR DOMINANT MODE. (TE11)
CHOSEN DIA. IS 7 INCHES
```

PROBE-

-------CONNECTOR-----

```
LENGTH=45.440931 INCHES
PROBE LENGTH=2.95275 INCHES
PROBE SPACING=18.176372 INCHES
FROM CLOSED END.
ANOTHER? (Y OR N)
```

in April 83 QZX. The program includes full time display, scrolling on TX & RX, constant mode monitor, auto upshift & shift, special characters, and works with 2K RAM. Interface schematic includes 100 & 60 WPM. Price for cassette copy and schematic is $10.00, send to: AF8J, L. Willson, 149 Hoehn Ct. POB 465, Dimondale, Mich. 48821. (interface PC boards avail soon from WB8UJB).

ANTENNA BEARING CALCULATOR PROGRAM- Your QTH to any location in the World. Gives Bearing & Distance. File of 345 locations, plus room for 20 locations of your choice. Search by Name or Call Sign Prefix. $12 PPD. Send SASE for list of other programs available. George W. Miller, N3CJP, RD 2 Box 132A, Mechanicsburg, Pa. 17055

FREE: - Several short technical programs. Send SASE to Fred Nachbaur, POB 5177, El Monte, Calif. 91734

Products in Review

This column will provide reviews of hardware 'add-ons', software, and books that are available for the Sinclair computers. Again, we will do reviews as our budget allows, or as they are loaned/donated by vendors for review. Reviews done by our subscribers will also be welcomed.

The first review was to be on the Z-XLR8. The wife's packing our bags, I gotta get QZX mailed! I have tried Z-XLR8 twice and LOVE it! If you are having reliable, but slow loads/saves, it is well worth the money. The 7 minute Gazeeteer program loads/saves in 56 seconds without fail! I promise to 'do it justice' next month, but if some of you buy it in the meantime, I will personally buy it back from you (the first two received) if you aren't satisfied. They provide an EPROM version that fits inside the ZX or you can do as I plan, and burn your own (from the cassette version).

Next, we were fortunate to be sent an issue (Feb 83) of C-20 a monthly 'tape magazine'. It costs $59.95/year or $9.95 for one issue. It is available from C-20 Magazine, POB 3801, Wichita, Kansas, 67201. Its very easy to 'read'. Simply LOAD"" and up comes the editor's notes and explanations of the programs. This 'program' and 4 out of the 6 others will load in a 2K machine, the remaining two are for 16K. The first one is a BANNER program, which provides a horizontally moving display (4 letters visible at a time) of black letters on a grey background. It would be useful by itself, incorporated into your own program, or useful as a learning tool on programming techniques. Great for ATV (amateur television). The next one plots the graphical results of mathematical equations. For example, Y=4 * SIN X + 2 * COS(X/2) looks neat. The third one, 'bounce' is a demo only, creating a box and then a bouncing dot eats out pieces like the 'breakout game'. A useful learning tool, no operator input. The fourth one is a 'revolver' game like Russian roulette, you pick a chamber, it goes click or bang. Nothing to get excited about. The fifth one, requires 16K and is a 'hangman' vocabulary/word guessing game. It has some stored words and you can add more. Its kinda neat. The last one, 'inchworm' is like a 'hustle' game I have on the TRS80. You crawl around the screen eating up numbers and as you do, your tail gets longer and longer. It gets rather difficult after a while and sooner or later you will step on your tail. Its a simple minded game that gets you excited. So there you have it. I would like to get, and perhaps publish the contents of all issues. Recent and upcoming educational programs have covered math, geography, and spelling. Readers can respond through the C-20 mailbox column. At first I thought the price was a bit steep, but $5 per tape on an annual subscription wouldn't be unreasonable if all issues were as good as the March issue. You are guaranteed at least 75 programs/year - less than 80 cents each. At $10 per single copy, it would have to contain a specific program I was interested in. I'm sure he pays the authors more than QZX and spends a LOT of time in tape preparation. C-20 comes with copies on both sides, a definite plus. If I get more info on other issues I will

report.

KE3Y highly recommends Mastering Your Timex Sinclair 1000 Personal Computer by Hartnell & Jones. (Bantum Book 0-553-23241 priced at $3.95. QZX members will find this well and clearly written book an exciting compliment and extension to the ZX81 instruction manual. He said that he wished he had had it when he bought the ZX81 over a year ago. The book sticks to fundamentals and is not cluttered with ZX80 and MicroAce chatter which spoil most other good books. K5XY bought the book at one of the bookstores in the local shopping mall and completely agrees.

Concerned over the possible loss of 'protected software' which usually only has one copy on the tape, QZX bought the Z-Dubber. It costs $31.95 (total) from Bytesize Micro Designs, POB 21123, Seattle, Wash. 98111. It comes with a 30 day satisfaction guaranteed offer and I must admit I was about ready to send mine back before I finally found my problems. I had tape head alignment problems AND an intermittent connnector! After fixing them and finally getting used to the Z-Dubber I can safely say it allowed me to 'back up' the protected tapes and it does help in the loading of pesky tapes. It is a simple op amp conditioning circuit running off of +- 1.5 volts no less, and comes in a neat 'cassette tape box' nicely painted and labeled. It cleans up signals for easier loading and has another output for tape to tape duplicating. The input level is set using a LED and I will admit that until I got the LED bargraph built (described last month) I did have trouble getting the Z-Dubber to load/copy reliably. In conclusion, it served its purpose and is therefore worth the cost. The 30 day return offer makes it worth a try in the event you are having loading/copying troubles.

QZX Friends

Here's your chance to let your ambitions and accomplishments be known. Feel free to let us know what you are up to, and to contact [illegible] 'doing your thing'.

KD6TO - Dave has used the NU4V cw program with a Computer Continuum expansion board and a demodulator from the book Computers and the Radio Amateur by Anderson.

KØAM - John says that the superduper program in the March issue works GREAT.

W7UUD - Gordon recently acquired a TS1000 to go with his AIM65.

WA3VIL - Larry, the Hints & Kinks editor of QST, has written and asked for a subscription. He says the the most interest lies in trying to interface the TS1000 to CW (use NU4V's program of course) and using the computer for RTTY. We agree and that's why QZX is around. The ARRL's QEX also has good info.

***** - Wilson Perry was one of the original subscribers. He built a ZX80 and added 8K of ROM and a keyboard. He is looking for a mod which will allow 'slow' operation.

HH2WL - Lawrence has moved to H[illegible] and plans on using his new TS100[illegible]n battery power with his TS130-SE. (He has a new TS1000 because his old one was stolen in Miami.)

***** - Fred renewed his offer of FREE software (an SASE would be appreciated) to all who request it (until copies are gone). He also says the Unclassified Ads DO WORK. He likes the funny call letters we gave him (and all non-hams). They are there for a call letter sorting program I haven't written yet. Perhaps we could 'sort out' all the *****'s and get them interested in ham radio.. Ed..

WA4PSW - Jerry, a TS1000, 16K, CWSS user, wrote to say that he was pleased with the reports and programs in QZX. (Many TNX. Ed.)

QZX Net Info

Taking a gamble that everyone shifted one hour as a result of Daylight Savings Time, I moved the net times one hour. Hope its [illegible].

Freq.	Time	Day	Source	Location
7.240	1600Z	Sun	KQ2F	East coast

146.07	0130Z	Tue	K5XY	Manhattan,NY
147.84	0200Z	Wed	WB5HVS	New Orleans
146.28	0100Z	Tue	N3ADF	Wash, DC
146.16	0100Z	Thu	N1CB	Vermont/NH
3.980	2400Z	Fri	N3CJP	East coast
14.345	0200Z	Thu	NU4V	USA
14.329	2100Z	Sun	W9CQD	USA
7.245	0200Z	Wed	W9CQD	USA
7.235	1900Z	Sat	W6AMW	West coast
7.228	1800Z	Sat	K4KEP	East coast
7.228	1800Z	Sun	K4KEP	East coast
146.04	0200Z	Thu	KB3YT	Pittsburgh

Bits & Bytes

This column will try to track and document the quirks, fixes, and unique modifications done to the Sinclair computers. Let's hear from you.

Here's what we have this month:

19. WB8UJB was bothered by snow (aren't most Yankees?) and patterns on his TV when using external memory on his TS1000. He cured the problem by salvaging a ferrite rod from an old AM radio and wrapping the coax lead to his TV set six times around the rod. He then taped it down to make it neat.

20. It has been reported that certain TV's which have a new style solid state tuner will not work with the TS1000. (Wonder if Clive is working on that one?) These sets can be identified by the absence of any vertical or horizontal controls. Zenith models SN1973, S41926, S4127 and the Y1908 are reported not to work. Also the Tekneka models 3249, 3349, 3379, and 3439.

21. On page 143 of the TS1000 user manual there is an obvious misprint. The character code for PAUSE should be listed as 242 not 241.

22. Here's a 'missing' byte. Your clumsy editor tore the flimsy keyboard to computer 'cable'. Thinking it consisted of metal strips on the thin plastic, I CAREFULLY tried to solder it! RONG! I even tried it twice! RONG again!. I now have two holes in the plastic. Well, I was going to impress all you readers by finding some 'electrically conductive' epoxy and use it to splice some wires over the cut and my holes. I haven't had time to try this and was wondering if anyone else had 'gone this path'? Since I have the added $19.95 Jameco keyboard, I haven't needed the original one and am not in trouble. Any comments?

Miscellaneous Comments

W5RRP has written a straightforward program giving eight formulae for calculating resonance, coil design, and series capacitance. He starts off with a nice menu selection routine, and the program is about 170 lines long and is easy to use. Dale has offered to record the program for anyone who sends him a tape and return postage. His address: Dale Miller, W5RRP, Route 5, Box 22K, Slidell, La.,70458

Alex, K5XY, said he was going to Bangle -a- Dish (sounds like a foreign country to me) and wouldn't be back until mid-July. Mail delivery will be a bit faster in the meantime if sent direct to me: W4GHV, 1967 Defiance Ave., Las Cruces, N.M. 88001.

73, W4GHV and K5XY

QZX presents the best software and hardware projects available for the radio amateur. While the contents are believed to be accurate, no warranty is extended on any program or project. No investigation has been made of the claims or reputation of any advertiser. It would be greatly appreciated if all correspondance requiring an answer would be accompanied by a self-stamped envelope (SASE). Copyright by QZX, 1983. All rights reserved, Photocopying by permission only.

```
**************************************
*  Please send me QZX for 1 year,    *
*starting immediately. Enclosed is   *
*       $12.00 for first class       *
* mailing. (Those with addresses     *
* not in Canada, the U.S, or Mexico  *
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```

QZX
2025 O'Donnell Dr.
Las Cruces, N.M. 88001

LAS CRUCES NM
PM
MAY 18
1983
88001

USA 20c

Tom Arbster
*****
Box 477
Bethany, Okla.
73008